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# Levels of evidence of published articles in major Nigerian medical journals: a critical appraisal

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**Summary**

In modern day medical practice, "rules of evidence" have been established to grade clinical and research findings according to strength. The aim of this study is to describe the current pattern of publications in 5 major Nigerian medical journals in terms of levels of evidence. Five major peer-review medical journals (Nigerian Q J Hosp Med, Nigerian Post grad Med J, West African J Med, African J Med Med Sci, and Nigerian J Clin Pract) published in Nigeria were included in the study. All articles published in 2005 and 2006 were accessed, classified into four levels of evidence, and pattern of publications was described. All eligible 580 published articles were analysed. None (0%) achieved level I evidence, 15 (3%) were level II, 47 (8%) level III, and 258 (44%) level IV; and the majority (n=260, 45%) of the published were classified as non-evidence. There were more evidence articles in indexed journals than in non-indexed one ($P$=0.000). Among the 260 non-evidence articles there were 97 (37.3%) case reports, 28 (10.8%) non-systematic review articles, 30 (11.5%) animal studies, 6 (2.3%) laboratory studies, 3 (1.1%) technical notes and 94 (36.1%) were classified as others (KAP studies, reports, guidelines, questionnaire-based studies). The general level of evidence of articles published in the five major medical journals in the 2-year period 2005-2006 was low as only 11% of articles were levels II and III. There is a need to improve on the quality and funding of medical research in Nigeria in order to promote better patient care.

**Keywords:** *Rule of evidence, published, journals appraisal, medical, Nigeria.*

**Résumé**

Dans la pratique de la médicine moderne, "Force de l'évidence" ont été établi pour régler les résultats des recherches cliniques en fonction de leur force. Le but de cette étude est de décrire la fréquence des publications dans 5 journaux majeurs médicaux Nigérian en fonction de la force de l'évidence. Cinq journaux médicaux de répute (Nigerian Q J Hosp Med, Nigerian Postgrad Med J, West African J Med, African J Med Med Sci, et Nigerian J Clin *Pract*) publiés au Nigeria étaient inclus. Tous les journaux publiés entre 2005 et 2006 étaient évalués, classés en quatre selon leur niveau d'évidence et la fréquence de publication était décrit. Tous articles publiés éligibles étaient analysés. Aucun (0%) n'atteint le niveau d'évidence I, 15 (3%) étaient au niveau II, 47 (8%) niveau III, et 258 (44% ) niveau IV; et la majorité (n=260, 45%) des articles publiés n avaient pas d'évidence. Ils avaient plus articles évident dans les journaux indexés que les non indexés ($P$=0.000). Parmi les 260 d'articles non-evident, ils avaient 97 (37.3%) cas rapportés, 28 (10.8%) de revue non-systematique, 30 (11.5%) étude animales, 6 (2.3%) étude au laboratoire, 3 (1.1%) notes techniques et 94 (36.1%) étaient classés comme autres (guides, questionnaire). Le niveau général des évidences des articles publiés dans les cinq journaux médicaux majeurs dans les 2 dernières années 2005-2006 était faible vu que seulement 11% des articles étaient aux niveaux II et III. Il est nécessaire d'améliorer sur la qualité et le financement des recherches médicales au Nigeria afin de promouvoir des meilleurs soins de santé

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## Introduction

Evidence-based medical practice (EBP) is defined as "the conscientious, explicit and judicious use of current best evidence about care of individual patients' integrated with clinical expertise and patient values to optimize outcomes and quality of life" [1]. Evidence-based care is now regarded as the "gold standard" in health care delivery worldwide. EBP involves tracking down the available evidence, assessing its validity and relevance, and then using the "best" evidence to inform decisions regarding care [2]. The primary aim and the most valuable application of the evidence-based approach to the practice of medicine is "to encourage the ordinary practitioner

to look for and make sense of the evidence available in order to apply it to every day clinical problems" [3].

EBP involves the integration of best research evidence with clinical expertise and patient values. These 3 important components (best research evidence, clinical expertise and patient values) are the key to evidence-based practice, each one being essential and indispensable [4]. The importance of having best research evidence for the care of patients has been emphasized [5], and research evidence have been categorized according to the strength of their freedom from the various biases and errors that beset medical research [2,6]. Ranking of evidence into different levels and grades of recommendation was first described by Fletcher & Sackett about 3 decades ago [7]. Since then, several tools have been designed to rank and categorize levels of research evidence in medical practice [8,9]. Quality of care has developed into a research field in itself, providing sophisticated methods to change clinical practice, and understanding where research is missing is critically important; and this lack is often the case in general practice [5].

Therefore, the aim of this study is to describe the current pattern of publications in five major Nigerian medical journals in terms of levels of evidence using Australian National Health and Medical Research Council (ANHMRC) [8] guidelines.

## Methods

Five major peer-review medical journals (African Journal of Medicine and Medical Science {AJMMS}, West African Journal of Medicine {WAJM}, Nigerian Quarterly Journal of Hospital Medicine {NQJHM), Nigerian Postgraduate Medical Journal {NPMJ}and Nigerian Journal Clinical Practice {NJCP}) published in Nigeria were included in the study (Table 1). All individual articles from 2005 to 2006 (for AJMMS, December 2004 to September 2006 issues were considered as the December 2006 issue was not available at the time of data collection) were accessed, read through and classified into four levels of evidence based on the Australian National Health and Medical Research Council (ANHMRC) guidelines [8]. This classification incorporates all research questions with minor differences (Table 2).

Articles such as single case reports, technical notes, guidelines, animal/laboratory studies, expert opinion, non-systematic reviews, KAP (knowledge, attitude and practice) studies and other questionnaire-based studies were considered non-evidence (Table 2). Editorials, letters, discussions or comments, notes and announcements were excluded from the analysis. Level categorization and data input were done by the first and second authors, and uncertainties were settled by discussion with the third author.

Data was analyzed using the software SPSS for Windows (version 12.0: SPSS, Chicago IL). For analysis, simple frequency charts, descriptive statistics, and test of significance were used. A level of $P<0.05$ was considered to be statistically significant.

**Table 1:** Five major medical journals included in the study

| Journals | Owners | Status (Medline/PubMed) |
|---|---|---|
| Afr J Med Med Sci | College of Medicine, University College Hospital, Ibadan | Indexed |
| West Afr J Med | West African Postgraduate Medical College | Indexed |
| Nig Q J Hosp Med | Lagos University Medical Society (LUMS) | Not Indexed At the time |
| Nig Postgrad Med J | National Postgraduate Medical College of Nigeria (NPMCN) | Indexed |
| Nig J Clin Pract | Medical and Dental Consultants Association of Nigeria (MDCN) | Indexed |

## Results

Of the five journals, 4 are indexed in Medline/PubMed and 1 (NQJHM) was not yet indexed in Medline/PubMed during the period under cover (Table 1). A total of 580 articles from the 5 journals met the inclusion criteria for the study. Of these, 320 (55%) were considered evidence articles and 260 (45%) were non-evidence articles. WAJM had the highest number (67%) of evidence articles, and the lowest (25%) number was found in NQJHM. Table 3 shows the % distribution of evidence and non-evidence articles in the 5 journals during the period. There were

more evidence articles in indexed journals than in non-indexed one ($P$=0.000) (Table 3).

**Table 2:** ANHMRC guidelines for levels of evidence [7]

| | |
|---|---|
| Level I | Systematic review/meta-analysis of randomized controlled trials (RCTs) |
| Level II | Randomized control trials (RCTs) |
| Level III | Non-randomized control trials, cohort studies, case-control studies, longitudinal studies |
| Level IV | Retrospective studies/case series |
| Non-evidence | Case reports, non-systematic reviews, technical notes, animal and laboratory studies |

**Table 3:** Distribution of evidence and non-evidence articles in the 5 medical journals reviewed

| Journals | Number of evidence articles (%) | Number of non-evidence articles (%) |
|---|---|---|
| AJMMS | 76 (56) | 60 (44) |
| WAJM | 106 (67) | 52 (33) |
| NQJHM | 18 (25) | 53 (75) |
| NPMJ | 79 (55) | 65 (45) |
| NJCP | 41 (58) | 30 (42) |
| All Journals | 320 (55) | 260 (45) |

**Table 4:** Levels of evidence in the 5 major medical journals

| | I | II | III | IV | Non-evidence | Total |
|---|---|---|---|---|---|---|
| AJMMS | 0 | 3 | 16 | 57 | 60 | 136 |
| WAJM | 0 | 6 | 17 | 83 | 52 | 158 |
| NQJHM | 0 | 2 | 3 | 13 | 53 | 71 |
| NPMJ | 0 | 3 | 7 | 69 | 65 | 144 |
| NJCP | 0 | 1 | 4 | 36 | 30 | 71 |
| Total | 0 (0) | 15 (3%) | 47(8%) | 258 (44%) | 260 (45%) | 580 (100%) |

**Table 5:** Frequency distribution of the evidence articles

| Levels | Number (%) |
|---|---|
| I | 0 (0) |
| II | 15 (5) |
| III | 47 (15) |
| IV | 258 (80) |
| Total | 320 (100) |

Out of the 580 published articles, none achieved level I evidence and only 62 (11%) were Levels II-III evidence (Table 4). Of the 320 categorised as evidence articles, majority (n=258, 80%) were Level IV evidence (Table 5). Of the 260 non-evidence published articles, majority (n=97, 37.3%) were case reports. Other non-evidence articles were non-systematic reviews (10.8%), animal experimental studies (11.5%), laboratory studies (2.3%) and others (KAP and questionnaire-based studies, etc) (Table 6).

**Table 6:** Frequency distribution of the non-evidence articles

| Non-evidence articles | Number (%) |
|---|---|
| Case reports | 97 (37.3) |
| Non-systematic reviews | 28 (10.8) |
| Animal studies | 30 (11.5) |
| Laboratory experimental studies | 6 (2.3) |
| Technical notes | 3 (1.1) |
| Tutorials | 2 (0.8) |
| Others (KAP, questionnaire-based studies) | 94 (36.2) |
| Total | 260 (100) |

## Discussion

Evidence-based practice (EBP) involves the integration of best research evidence with clinical expertise and patient values [1]. These important components (research evidence, clinical expertise and patient values) are the key to evidence-based practice, each one being essential and indispensable [4]. The reciprocation of best evidence and its application to clinical practice produces a dynamic model in advancing knowledge for patient care. EBP implies not only clinical expertise, but expertise in retrieving, interpreting, and applying the results of scientific studies, and in communicating the risks and benefit of different courses of action to patients [10]. Treatment decisions and providing patient care using the best evidence and available technology supported by sound, rigorous research is fundamental to a state-of-the-art medical/dental practice [10].

The present report only deals with one aspect of EBP-levels of research evidence. However, it must also be emphasised that levels only deal with validity of the evidence; other strategies (e.g. critical appraisal of the evidence) must be applied to the evidence in order to generate clinically useful measures of its potential clinical implications and to incorporate vital patient-values into the ultimate decision regarding care [1,2].

In the past, clinicians learned from their own experience and mistakes, and there was often a tendency not to trust opposing views in the presence of evidence from clinical trials [11]. In 1991, during a conference held in Manchester, United Kingdom, the editor of the *British Medical Journal* noted that only about 15% of medical interventions were supported by good evidence, and that the quality of evidence, if any, was low level in those days [12]. However, the situation has changed dramatically in recent years due to efforts by many clinicians, researchers, epidemiologists, and statisticians who support the concept of evidence-based practice [11]. Clinicians began in just the past 12-14 years to substantially apply evidence-based practice concepts in the field of health care, including surgery, medicine, dentistry, nursing, and public health [11].

The general level of evidence of articles published in the five major peer-review Nigerian medical journals in the 2-year period was low as only 11% of published articles were levels II and III, none were level I evidence (systematic reviews/meta-analysis of RCTs) and 45% of published articles were classified as non-evidence. In addition, majority (80%) of articles categorized as evidence were level IV evidence (retrospective studies/case series). These findings may be a reflection of the quality of research being carried out in our institutions. If this is true, then attention should be focused on high quality researches on questions related to therapy, diagnosis, prognosis and aetiology rather than retrospective reviews, KAP studies and case reports. In addition, research funding; an important element of quality research needs to be made available to medical researchers by the government, governmental agencies and non-government organisations in order to promote better patient care. Our findings may also reflect the fact that most of the high level/quality research (RCTs, cohort and case-control studies etc) findings from our institutions are published in international journals. In fact, the present study revealed that there were more evidence articles in indexed journals than in non-indexed one ($P< 0.05$). Nigerian authors may feel comfortable publishing their high quality research findings (RCTs, cohort studies, case-control studies) in journals indexed in PubMed/Medline rather than non-indexed journals, in order to make their research findings accessible worldwide.

In addition, 67% of research findings published in WAJM was categorized as evidence when compared with 25%-58% evidence articles in other four journals during the review period. Although, the reason for this observation can only be speculated, it is our opinion that this may be a reflection of WAJM editorial policy. Perhaps, WAJM editors choose manuscript with high quality research evidence.

In the present series, only 3% of published articles were randomized controlled trials (RCTs) and none were systematic review/meta-analysis of RCTs. Randomized controlled trials (RCTs) are the "gold standard" by which all clinical research relating to therapy or preventive interventions is judged [2]. The fact that randomization keeps study groups as similar as possible from the outset, together with other features of the design, such as blinding, sample size justification, appropriate outcome measures and statistical analysis, means that RCTs have the greatest potential to minimize bias [2,13,14]. However, RCTs can not answer all clinical questions especially the ones regarding diagnosis or aetiology. For questions related to diagnosis, prognosis or aetiology, other study design such as cohort studies, longitudinal studies or case-control studies are often more appropriate [2]. Systematic reviews/meta-analysis of RCTs (SR/MA-RCT) otherwise called "secondary publication" where available are considered the highest level in the evidence hierarchy in terms of minimal bias and error [2,11]. SR/MA-RCT uses a highly reproducible and repeatable predefined method and a broad search frame to yield maximum numbers of relevant articles, then to select and to critically appraise them using standardized criteria to yield the valid articles for interpretation. This method intentionally excludes research of poor quality and provides instant results for clinicians' reference [15].

However, it should also be noted that in some cases, RCTs are not feasible [11]. Despite the rapid expansion of new technology in surgery and the increasing adoption of RCTs in other areas of medicine, it has been reported that RCTs form only 3% to 9% of clinical study design among all areas of surgery [4,16-18]. The most common problem of surgical RCT, if it is possible at all, is the methodological problem and feasibility of randomization. There seems to be a great problem in

compliance with the random allocation of different treatment options, irrespective of patient preference, when comparing drugs with surgery or standard surgery with new surgical methods [16]. Also, patient preference is a major factor hindering the performance of RCT [19]. It is always difficult to persuade patients to enter into a clinical trial of a new surgical treatment based on hypothesis. Medical trials of this type are well accepted but surgery is not [11]. The problem of surgeons' attitude towards RCTs has also been cited as the major problems restricting the performance of RCT in the field of surgery [18].

In the present series, 80% of evidence articles were level IV evidence. This may reflect the fact that retrospective case series are easiest to perform and the results can be generated in a relatively short period [11]. Authors only need to retrieve the records and analyze existing data based on the available follow-up of treatment already given to a certain number of subjects. There is no need for prospective planning and, thus, the cost in terms of money and time is reduced: Retrospective case series is categorized as the lowest level of evidence due to the inability to control error and bias in terms of patient recruitment, operators, details of treatment, and standardized follow-up parameters such as measurement, radiographs, and the actual follow-up period [11].

Although, the majority of published articles in the 5 journals under consideration were either level IV evidence (44%) or non-evidence (45%), it is important to distinguish between the quality/ level of clinical evidence and its importance [4]. Case reports and case series are important although they can not be regarded as clinical evidence, because most of the time, more extensive and larger scale clinical trials cannot be conducted without the important findings described in case series and case reports [4]. Also, animal and laboratory experimental studies (preclinical studies) are important because they are considered an important step bridging the gap between case reports, technical notes and clinical trials [4]. New surgical techniques or drugs can be tried on animals to detect any unforeseen complications and outcomes [4]. New devices can be tested in laboratories before they are inserted into human bodies. Sometimes these studies are of utmost importance in terms of ethics, politics, administration, public health, commercial aspects and scientific values [4]. Clinical trials are done only after "preclinical" studies suggest that the proposed treatment is likely to be safe and effective in human subjects.

## Conclusions

The general level of evidence of articles published in the 5 major Nigerian medical journals published in Nigeria in the 2-year period was low as only 11% of articles were levels II-III. There is a need to improve on the quality of medical research in Nigeria. RCTs, cohort studies, case-control studies, longitudinal studies with low attrition rate are considered the best research designs for clinical questions relating to therapy, preventive interventions, aetiology, diagnosis or prognosis. Most importantly, research funding is an important element of quality research needs to be made available to medical researchers by the government, governmental agencies, pharmaceutical industries and non-government organisations in order to promote better patient care.

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